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ALFALFA (*Medicago sativa*).

[Instructions adapted to the sand-hill section of Nebraska.]

Native dry-land strains.—Seed of this class of alfalfa is secured from nonirrigated fields in the semiarid sections of the country. It is usually ordinary alfalfa which has been grown for years under dry-land conditions. In this way the drought-resistant plants alone have survived, and such seed is preferable if it can be obtained.

Turkestan alfalfa.—This variety was secured originally from Turkestan and has been found to be generally more drought resistant than the ordinary alfalfa. It is not usually equal to ordinary alfalfa under irrigation or in sections with sufficient rainfall for full crops of ordinary alfalfa; in the sand-hill region ordinary alfalfa usually gives better yields.

Sand lucern.—A hardy, drought-resistant strain, adapted to a wider range of soils than ordinary alfalfa. It is proving equal to or superior to any of the strains now being grown for drought or cold resistance. In testing this or the other strains it is important that they all be seeded side by side under the same conditions. It is also very desirable that a plot of ordinary alfalfa be sown alongside the other plots to serve as a basis of comparison.

Locating the field.—The best soil obtainable should be chosen for the alfalfa field. Excepting in the wet valley region the best location will invariably be in the bottom of the valley where the soil contains the most humus and the moisture supply is the most constant. In the wet valleys the prospective alfalfa field should be located where the water table will be at least 4 feet under the surface of the ground. There have been successful fields where the distance to water was less in wet seasons, but the chances are very much against such a field. A well-drained piece of land with the water 8 to 12 feet beneath the surface is best. Too much water is as ruinous to alfalfa as too little, and even more so.

Preparation of the soil.—A field which has grown potatoes the year previous and has been quite heavily manured is very likely in the best shape for seeding alfalfa. Many farmers, however, do not have large potato fields and must therefore sow alfalfa after other crops, such as wheat or corn. It is very helpful if barnyard manure has been added to the soil several years before the alfalfa is seeded. It is never a good plan to plow under manure just before seeding, as it will make the soil dry out much more rapidly than if no vegetable matter has been added. If corn land is used and the field is in good shape, it may be prepared in the spring by disking the stalks down and leveling with a spike-toothed harrow. It is always best to kill the weeds out as thoroughly as possible in the spring before seeding the alfalfa. This is not always possible in the sandy soils, however, owing to the fact that the soil becomes quite loose if cultivated frequently and blows badly. To prevent this as far as possible, the ground should be left rough until it is time for seeding. If wheat ground is used it can be plowed in the spring after the first crop of weeds has started, left rough until another crop has germinated, and this second crop killed by harrowing with a spike-toothed harrow or disk.

Inoculation.—Throughout central and eastern Nebraska no trouble is experienced in getting a field of alfalfa inoculated. In the sand-hill country, however, many fields were noted which seemed to lack this very essential aid to growth. Numerous cases of winter injury would have been avoided if the field had been inoculated promptly and the growth during the late summer and fall had been more vigorous.

Lack of inoculation is shown by weak, spindling plants of a yellowish green color in the field. The addition of barnyard manure or vegetable matter of any kind always assists greatly in procuring inoculation. It is well, however, to take other precautions besides the addition of manure. It has been found that ordinary sweet clover, which is very plentiful farther east in the State and is found growing in many localities throughout the sand hills, is inoculated with the same bacteria which produce the nodules on the roots of alfalfa. It is apparent, therefore, that if a crop of sweet clover is grown on the soil prior to the seeding of alfalfa the ground will be thoroughly inoculated. Sweet clover is much hardier than alfalfa, and therefore it is much easier to get a stand of sweet clover than of alfalfa, and it not only supplies the ground with inoculation but adds to the soil also a large amount of vegetable matter in the shape of roots, which decay very promptly when the plant dies, and in this way sweet clover enriches the soil much more than almost any other crop. This amount of vegetable matter added to the soil by the decay of sweet clover roots has been estimated in some localities as 20 tons green weight per acre. A number of farmers throughout the sand hills have found that while growing the sweet clover they can make use of it as a pasture crop. Horses and cattle both eat it readily when it is small, and if it is cut before the stems become too coarse the hay is relished also. It would therefore be advisable to use sweet clover as an aid to the establishment of alfalfa fields throughout the sand hills.

When beginning a field on ground which has not been inoculated by the method just described, it is highly important, and usually very profitable, to secure soil from an old alfalfa field which is already inoculated or from a patch of sweet clover and scatter this soil at the rate of 500 pounds per acre over the ground which is to be sown in alfalfa.

The soil is best applied through a fertilizer drill, but as very few farmers in the sand hills possess a drill of this kind, the application must generally be made by broadcasting the soil with the hands and then covering it immediately with a disk or ordinary spike-toothed harrow before it has a chance to dry out from the action of the sun or wind, as sunlight is very quickly fatal to the bacteria.

When this inoculated soil can not be obtained near at hand it is best to go to the trouble of shipping it even from considerable distances rather than sow the seed without inoculation. In this event 200 or 300 pounds of the inoculated soil may be mixed with an equal amount of loose soil or sand in order to facilitate the scattering of it over the field.

Seeding.—Before seeding it is always profitable to spend sufficient time and money on the preparation of the ground to get it in perfect condition. Alfalfa seed is quite expensive, and a poor stand of alfalfa means that weeds will enter the field in the vacant spaces and in time ruin the field entirely.

When the ground has been thoroughly prepared as indicated previously, the best results should come from seeding from 10 to 15 pounds of alfalfa seed with a press drill. One can broadcast the seed also, but the germination is never as good when the seed is broadcasted and harrowed in as when it is put in the ground with a press drill. This largely arises from the fact that the soil is pressed down on the seed in the drill track and capillary action supplies the germinating seed with moisture, even though no rain falls for some time after the seed is sown.

In the case of broadcasted seed, where it lies in the loose soil, the seed is very apt to suffer from lack of moisture directly after it has germinated. It is better to seed half the required amount of seed one way and then cross-seed with the remaining half than to sow it all one way, as a more even stand is usually secured in this manner.

If a press drill is not available one can obtain about the same condition of soil by rolling the ground after it is seeded and then following the roller with a light harrow. If the soil is unusually sandy and liable to blow badly it is necessary to do something to keep the moving sand from cutting the young plants off as they appear above the surface of the ground. Some growers accomplish this by using a light dressing of barnyard manure. If such manure is free from weed seed it will not only keep the sand from blowing badly but will also supply the ground with additional plant food. The following is one of the best ways noted in which to accomplish this result and give the alfalfa a chance to start.

After the alfalfa has been seeded a very light dressing of native hay taken from old stack bottoms is scattered over the field. This dressing of hay should be quite thin and evenly distributed. The next process is to go on the field with a disk set very nearly straight and weighted, so that while it does not tear up the ground it will cut the hay into the soil and leave it standing over the field somewhat like stubble. Splendid results have followed this method of seeding, and where one has an extremely sandy soil it is advantageous to use this method.

There is considerable disagreement in regard to the time for seeding. The best time, however, seems to be late spring or early summer in the sand-hill section. Sown from June 15 to June 20 the young plants will escape the usual spring winds and at the same time catch the June rains. This will give them sufficient time also to make a good growth before fall and become inoculated thoroughly, and if the drought is not too severe through August and September there will be little danger of winter injury. Very few fields have been successful when sown in the fall, for the plants will usually be too tender to withstand the severe winds; and sown earlier in the spring the winds and weeds are very likely to damage the field to a considerable extent.

Subsequent treatment.—If the growth is large enough so that the plants bloom before fall, the field should be clipped by a mower with the cutter bar of the mower set high. If cut low, the plants are slow to recover from the shock of cutting and are more likely to be choked out by weeds; besides sufficient growth should be left on the field to protect the roots of the alfalfa to some extent through the winter. If the clipping is not so heavy as to smother the plants it may be left on the field, as it will be an additional protection during the winter and assist also in improving the sandy soil.

Need of experimenting.—Alfalfa is so peculiar in its requirements that several trials are sometimes necessary before one becomes sufficiently familiar with it to be at all sure of securing a stand. These early failures are discouraging, especially when made on a large scale. For this reason it is recommended that the first attempts be made upon a rather small scale. The greatest possible amount of experience can be obtained by dividing the selected area into a number of subdivisions and giving each a somewhat different treatment as regards preparation of the soil, time and rate of seeding, depth of covering, etc. Each plot will give one year's experience in regard to the behavior of alfalfa under the conditions present. The several plots will give at the end of the first year the experience which would ordinarily require a number of seasons to procure. The successful plots will clearly show what it is necessary to do in order to produce a successful stand. The plots which prove a failure will show just as clearly what not to do. The treatment giving the best results can be applied upon the increased acreage the following season.

A rough diagram of the experimental plot should be made at the time the plots are laid out. The treatment given each should be carefully recorded and further notes made from time to time as to the success of the different methods of treatment. This will enable one to refer to the work at any future time. The results should be made available to all interested neighbors.

Among the questions to be decided on by this experimentation are: Need of lime, necessity of inoculation, benefit of barnyard manure, methods of seeding, time of seeding, and rate of seeding.

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